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ABSTRACT

Although New York State introduced its standards-based reform over a decade ago, it remains unclear as to how local education agencies (LEAs) have reconfigured their human resources in response to these initiatives. This paper demonstrates how state-collected personnel data can be used to generate longitudinal indicators of the kinds of educational opportunities actually being delivered to students and how these opportunities have changed over time. The paper examines three structural characteristics of LEAs--district fiscal capacity, school district size, and district spending level. Data from the Basic Education Data System and the State Education Department's education-finance database were analyzed from 676 school districts for the year 1982-83, 660 districts for 1987-88, and 670 districts for 1991-92. The study found that the rate of growth in professional staffing relative to student enrollment was substantially greater in secondary schools than in elementary schools. Substantial reductions in the overall pupil load on the secondary level were found throughout the state, with the exception of New York City. The findings suggest that local districts shift resources according to state priorities, and that local school districts are able or willing to respond to some aspects of the reform agenda and not others. The examination of resource-allocation trends by selected district structural characteristics found that substantial inequalities in access to curricular opportunities existed across different types of districts. Students residing in poor, low-spending districts had less access to professional staff and rigorous instruction than their counterparts in wealthy, high-spending districts. These gaps have increased over time. Specific curricular opportunities for students appear to be contingent upon the fiscal capacity of the district in which they reside. In addition, New York City schools were particularly understaffed compared to their big city counterparts and the state as a

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whole. Finally, the report describes the stumbling blocks encountered when using the state-collected data. (Contains 33 references and 12 tables.) (LMI)

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Tracing the Flow of Human Resources Across Organizational Units and Secondary School Subject Areas

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Tracing the Flow of Human Resources Across Organizational Units and Secondary School Subject Areas

1. Introduction

Because personnel costs consume the majority of school budgets, the allocation and use of human resources has significant equity and efficiency implications. The amount of teacher time devoted to the various areas of the school curriculum, for example, is one determinant of students' access to knowledge. Despite the importance of such data, relatively little is known about the specific allocation of human resources across districts, schools, program areas and classrooms. Even less is known about how these allocations have shifted over time.

Part of this ignorance is due to the lack of strong, consistent indicators of internal resource allocation phenomena. New York State's Education Department, however, maintains an extensive data collection operation which permits longitudinal analyses of resource flows within schooling systems. One goal of this paper is to unlock the potential of this kind of data collection system and demonstrate how these systems can be better utilized to inform policy makers and decision makers in education. More specifically, I seek to demonstrate how State collected personnel data can be used to generate longitudinal indicators of the kinds of educational opportunities actually being delivered to students and how these opportunities have changed over time.

In earlier work, distinctions have been made between three dimensions of resource allocation in education; the origination, disposition, and utilization of educational resources (Monk and Roellke, 1994). The term "origination" refers to the size and nature of the resource streams that enter schooling systems. The term "disposition" refers to the decisions school officials and others make regarding how to distribute the pool of purchased and hired resources across programs and curricular areas. The term "utilization" focuses on the allocation of pupil time and effort across and within programs and curricular areas. The earlier work involved cross-sectional analyses of these three dimensions of resource allocation (Monk and Roellke, 1994; Monk and Roellke, 1995; Monk, Roellke and Brent, 1996). These cross-sectional analyses, which only capture resource allocation phenomena at a given point in time, may obscure important resource allocation trends that develop over extended periods. In this paper, I build upon these cross-sectional analyses to examine resource allocation phenomena over time.

Generating longitudinal indicators of resource allocation and student opportunity to learn can provide useful information for policymakers and researchers. Like many states around the country, New York has advanced a complex reform agenda in education which involves the development of curriculum and related standards. Particular emphasis in this standards-based reform has been placed on improving student access to rigorous curriculum in core subject areas such as mathematics, science, foreign language, social studies and English. While it has been over a decade since the State formally introduced it's standards-based reform strategy, it remains unclear as to how local education agencies (LEA's) have reconfigured their human resources in response to these initiatives. Specifically, I address the following central research questions:

1. During the recent period of State initiated education reform, how have local education agencies (LEAs) allocated and used their human resources across organizational units and within curricular areas?

2. Over this same period, to what degree is there variation in the manner in which different types of local education agencies (LEAs) have allocated and used their human resources?

Three structural characteristics of LEAs are examined:

a) District Fiscal Capacity: What differences can be found in the manner in which poor and wealthy schooling systems allocate and use their human resources?

b) District Size: What differences can be found in the manner in which small and large schooling systems allocate and use their human resources?

c) District Spending Level: What differences can be found in the manner in which high spending and low spending schooling systems allocate and use their human resources.

3. What are the implications of these findings for future data collection, research and policymaking in education?

I begin with a brief review of the reform agenda in New York State and the implications these proposals have for student access to human resources within schooling systems. This discussion is followed by an overview of recent efforts to develop micro level indicators of student opportunity to learn and an outline of the data and methodology employed for the empirical analyses. I then turn to a review and discussion of the findings and conclude the paper with a discussion of implications for policymaking and future research.

II. An Era of Education Reform

In the 1980's and early 1990's, a multitude of national reports described an educational system plagued with ineffectiveness. On the Federal level, most notable of these reform initiatives was A Nation at Risk (1983), published by the National Commission on Excellence in Education. The Commission argued that the whole educational system needed to be restructured and revitalized through standardized, "back to the basics" curricula, increased graduation requirements, and state level control. Specifically, the Commission asserted that high school students should complete a core curriculum that includes: four years of English; three years of science; three years of mathematics; two years of a foreign language; and one-half year of computer science.

Another influential national report, The Carnegie Forum on Education and the Economy Report (1986) proposed a different set of reforms; reforms that would enhance teacher professionalism and satisfaction in the workplace. In addition to higher teaching salaries, the Carnegie Report advocated a greater teacher voice in decision-making, increased opportunities for professional development, and more reasonable workloads for teachers. New York was one of many states that quickly responded to the influential national reports of the 1980's and developed its own reform strategy.[1] The Board of Regents Action Plan to Improve Elementary and Secondary Education Results in New York (1984) echoed the "back to the basics" theme of the national reports and advocated increased graduation requirements, higher standards for personnel, and greater accountability. The most specific recommendations in the Regents Action Plan were targeted at the secondary school curriculum, with particular emphasis placed on high school mathematics, science and foreign language curricula. The State's more recent reform strategy, A New Compact for Learning: Improving Public Elementary and Secondary

[1] By 1990, for example, over 40 states had increased graduation requirements in a direct response to the Nation at Risk Report. See Coley (1994).

Education Results in the 1990's (1991), is a systemic reform strategy which stresses principles of local control and decentralized decision-making.

A content analysis of these major reform efforts in New York State reveals four broad and overlapping categories of reform: 1) increased emphasis on core subject area content; 2) higher standards and expectations for students; 3) instructional time; and 4) higher standards and expectations for teachers.

The first category of reform, content emphases, involves the standardization of a "core curriculum" for all students. The subject areas emphasized in this core curriculum are English, mathematics, science, social studies and foreign language. The second category of reform, standards and expectations for students, calls for increased graduation requirements, additional homework and additional assessments of student work. Also included in this category of reform is the effort to improve academic rigor of textbooks and instructional materials. The third category of reform, instructional time, focuses on maximizing the amount of learning opportunities for students through lengthening the school day, lengthening the school year and improvements in scheduling. The fourth category of reform, standards and expectations for teachers, encompasses issues of teacher accreditation, professional development and workplace satisfaction. Recommendations in this category of reform include enhancing professional development opportunities, encouraging innovation in the classroom through the use of grants and incentives, and reducing teacher workloads. In addition to reducing overall pupil loads, efforts in this area include minimizing disciplinary and administrative burdens for teachers.

Emerging within these categories are potentially contradictory themes in the reform agenda. On the one hand, the reform involves the push for more central control, standardization, and accountability. On the other hand the reform also emphasizes decentralized decision-making, teacher professionalism, and teacher satisfaction with the workplace. Another important potential contradiction within these reform efforts centers around the use of teacher time. The reforms seek to simultaneously increase student contact time with teachers (particularly in core subject areas) and the amount of time teachers devote to planning, decision-making, parental and community accessibility, and professional development activities. It will be important to determine how school districts have responded to these potential contradictions. Conceivably, it would be difficult for school districts to address these competing uses of teacher time without adding additional staff or increasing the school day/year.

It would not be feasible to assess the local response to every aspect of this highly complex set of reforms. Consequently, it is important to establish some priorities. Any effort to simultaneously shift content emphases, raise standards for students, expand instructional opportunities, and improve the working environment of teachers, is likely to require substantial changes in the manner in which school personnel are allocated and utilized. This paper, with its focus on how human resources have been distributed and used over time, permits an analysis that cuts across all four categories of reform.

For example, The Board of Regents Action Plan (1984), explicitly calls for an increase in the graduation requirements in foreign language from one unit to four units. In order to meet the State's expectation in the foreign language area of the curriculum, school districts conceivably have four options regarding the allocation of human resources: 1) increase the class size within existing foreign language courses or require existing foreign language teachers to teach additional sections 2) shift existing staff members in other subject areas to foreign language; 3) recruit and hire additional teachers in foreign language; or 4) reconfigure human resources through some combination of the first three options.

There are a number of potential constraints at the local level which may limit the

number of options available to a school district.[2] Collective bargaining agreements, which typically specify teacher workload expectations and class size targets, may place limitations on what school districts can expect of existing staff (options one and two). Fiscal constraints might prohibit a poor district from adding additional staff (option three). In this case, a district might be forced to consider the allocation and use of human resources a "zero-sum game", that is if one area receives additional resources, something else must be left out or de-emphasized. These potential constraints contribute to the rationale for integrating selected district structural characteristics to the analyses, such as school district enrollment size, district spending level, and district fiscal capacity.

III. The Need for Micro Level Indicators of Student Opportunity to Learn

In establishing research priorities in the field of education finance, analysts have stressed the importance of moving beyond the conventional paradigm for conducting resource allocation studies in education. Barro (1989), for example, outlines methodological and topical improvements in research that could fuel a revival in education finance and provide useful information for policymakers. In particular, Barro emphasizes the need to move beyond the district level of analysis to consider internal distributions of resources to gauge students opportunity to learn.

> ...we know virtually nothing about how school systems distribute their funds among curricular areas or programs. Despite the attention policymakers have given to basic skills performance, for example, we cannot say how much our school systems are spending to develop basic skills or how that investment varies among places, and consequently we do not know how the level of investment would be altered by any policy proposals. [3]

Another outgrowth of the education reform movement has been a dramatic change in the way school finance is conceptualized and carried out. The so-called "new school finance" is characterized by the linkage of finance structures to programs and strategies that are likely to make a difference. Another feature of the new school finance is a shift from district-based budgeting to school-based budgeting. These changes are reflected in new conceptions of educational equity which have a much more micro-focus. In his report, "School Finance in the 1990's," Odden proposes three transformations regarding educational equity:

> 1. school finance equity indicators need to be linked more directly to a set of more comprehensive educational indicators.
> 2. school finance equity frameworks need to move beyond expenditures and revenues as indicators of educational resources.
> 3. school finance equity data need to be developed on a school basis, not just at the district level as is common practice today.[4]

This transformation of school finance from a macro-level, expenditure driven enterprise to a more micro-level, resource driven system has been a gradual one. This transformation is reflected in the fundamental changes that have occurred in school finance litigation over the last three decades. In "first wave" litigation, plaintiffs challenged school financing systems with the equal protection clause, arguing that education was a fundamental right and that wealth was a suspect class. The general result of these first

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[2] For additional discussion of how local constraints affect the resource allocation process, see Nakib (1995) and Roellke (1996)

[3] Barro (1989) p.23.

[4] Odden (1990), p.15.

wave cases was that discrepancies in expenditures were recognized but not considered unconstitutional. Education was not considered a fundamental right and wealth was not granted suspect classification.[5]

In "second wave" cases, plaintiffs sought relief through state education clauses and or state constitution equality guarantee clauses, arguing financing structures did not produce a "thorough and efficient" system of public education. There were plaintiff victories in the second wave, and courts directed legislatures to remedy the inequalities.[6]

The "third wave" of school finance litigation has proven to be the most fruitful for plaintiffs. Plaintiffs again used education clauses in state constitutions to seek relief. The judicial activism of the third wave is what distinguishes it from the first two waves. Although the state education clause had been a successful tool for plaintiffs during the second wave, third wave courts have taken "thorough and efficient" claims to a new level and have mandated rather specific reform initiatives.

This recent, "third wave" of school finance litigation illustrates the growing interest in resource allocation at increasingly more micro levels and the development of new conceptions of educational equity. Consider the on-going litigation in Texas where the courts have prompted an elaborate reform which permits wealthy districts to transfer wealth to poorer districts located elsewhere within the state. The courts have also moved beyond the dollar metric to gauge educational equity. Both the New Jersey Court (Abbott) and the Kentucky Court (Rose) for example, assessed educational opportunities in terms of measures of services and programs available to children.[7] The Kentucky court, for example, went as far as defining what constitutes an efficient system of common schools. The most prescriptive of the major third wave courts, the Kentucky court outlined seven expected student outcomes including "understanding of governmental processes," sufficient grounding in the arts," and knowledge of his or her own mental and physical wellness."[8]

Recent litigation in Los Angeles focused on inequalities among schools within the same district (Rodriguez v. Los Angeles Unified School District, 1992). The final settlement called for the district: (1) to equalize basic norm resources, teacher experience, and teacher training among schools; (2) to provide all students with maximum access to teachers with experience and training; and (3) to mitigate the consequences of limited teacher experience and training wherever equalization cannot be achieved. In addition, by the 1997-98 school year, all of the regular schools within the district are expected to receive an equal dollar amount per pupil (within $100 per pupil). The district must also develop a computer system which will permit school by school budgeting of resources. The settlement goes on to describe requirements for new school facilities, which even includes maximum capacities for playgrounds (e.g. 1.4 playground acres per 500 students).

Taylor and Piche (1991) have observed, "the latest group of school finance decisions...are of great interest because in focusing on educational services, on special needs, and on the means by which services are delivered, they come closer to the heart of

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5 See, for example, San Antonio Independent School District v. Rodriguez (1973).

6 See, for example, Robinson v. Cahill (1973) and Hornbeck v. Somerset Board of Education (1983).

7 For reviews of this litigation, see Benson (1992) and Levine (1992).

8 See Yudof, et al (1992) p. 686.

what many educators regard as important."[9] These cases, however, present new challenges for the development, collection and interpretation of more micro-level indicators of resource allocation. In what follows, I provide a brief review of the kind of progress that is being made in the identification and development of relevant indicators.

In the United States, we spend close to $300 billion annually on K-12 public education (Picus, 1993). Despite the magnitude of this investment, we have made only limited progress at understanding how these funds are actually used. One of the constraints to answering the question, "where do the resources go?" has been the lack of continuity and consistency across the major data collection efforts. In addition, there is a lack of conformity among states and school districts in the way they collect, report and interpret fiscal information. There are differences, for example, in the way states and localities construct staffing classifications for librarians, guidance counselors, curriculum developers and other support services.

In recent years, the National Center for Education Statistics has been promoting the use of a common set of fiscal accounting categories. Until these common definitions are implemented universally, the ability for analysts to make meaningful cross-state comparisons of resource allocation behaviors will be limited. Nonetheless, some advances have been made toward understanding the distribution of resources among various expenditure categories.

Tetreault, Picus and Murphy (1996), Nakib (1995) and Monk and Roellke (1995) have conducted staffing analyses in California, Florida, and New York, respectively, which seek to piece together the internal resource allocation puzzle at the district and school level. Using state collected personnel data, these researchers have focused on the allocation of teachers' time to various areas of the curriculum. Brent and Monk (1995) have applied a product costing model to six comprehensive high schools within four school districts in New York State. This work is attempting to estimate direct labor costs per student unit across course offerings within these four schools.[10] A major limitation of each of these studies is that they capture resource allocation phenomena only at a given point in time. It will be important to supplement these cross-sectional analyses with more longitudinal examinations of internal resource allocation. In addition, assessments of how local education agencies are responding to specific reform initiatives is needed.

Within the field, researchers are beginning to shed light on the relationship between reform and internal resource allocation behavior. Furhman and Elmore (1990), for example, have examined the effect of externally initiated education reform on local control. Odden (1993), has studied the local response to school finance reform in Kentucky, New Jersey and Texas. In addition, progress has been made to determine the specific impact these reforms have had on instructional practice, the enacted curriculum, and other components of the delivery of educational services (Porter, et al 1993; Hannaway and Carnoy, 1993). Clearly, researchers are aiming their efforts at progressively more micro levels of analysis.

In New York State, a Special Commission was formed to conduct a major study of how internal school district spending practices have evolved in New York between 1979 and 1992 (Lankford and Wyckoff, 1993; Lankford and Wyckoff, 1995). One of most striking findings of this study was the rapid growth that has taken place in the funding of

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[9] Taylor and Piche (1990), p.16.

[10] See also, Monk, Roellke, and Brent (1996).

special education relative to other types of educational services. According to Lankford and Wyckoff's (1995) results, additional expenditures for disabled students totaled over a third of the increase in real per pupil expenditures between 1980 and 1992.

They also found that school districts within New York State have responded sluggishly to increases and decreases in enrollment. Districts with large enrollment decreases, for example, have had increases in real per pupil expenditures at least 25 percent larger than districts with enrollment increases. They conclude that this inelastic spending response may benefit students in districts with enrollment reductions relative to those in districts that experienced enrollment increases.[11] These detailed analyses of sub-school district resource allocation patterns represent a major advance in this line of research.

Consistent with the movement to address inequalities that move beyond the dollar metric, researchers have begun to examine resource allocation across different areas of the curriculum and across different types of students. Monk and Roellke (1994b, 1995) have conducted a cross-sectional analysis of the disposition and utilization of teaching resources across different types of school districts within New York State. Monk and Haller (1993) report the relationship between school size and the allocation of resources across subject areas. They examined the distribution of resources across subject areas (e.g. mathematics, English) as well as types of courses (e.g. remedial, regular, advanced).

In the recent Educational Testing Service report, What Americans Study, Coley (1994) reviews the national trends in high school course taking using high school transcript data. He found that between 1982 and 1990 course-taking increased in English, history, mathematics, science, foreign language and computer science. The percentage of students taking a "core curriculum" in high school increased from 2% in 1982 to 17% in 1990.[12] Increases were also found in advanced sequences of mathematics and science. Course-taking decreased in vocational areas and in remedial mathematics. Course-taking in social studies, visual and performing arts, and physical education remained stable over the period (Coley, 1994).

Research has also moved beyond macro levels of analysis by addressing inequalities at the school and sub-school levels. In her study of district and school-level equity in California, Hertert (1994) found that despite equalization in funding across districts, intra-district (between schools within the same district) equality has not been achieved. In his examination of the variability in curricular emphases, Goodlad (1984) revealed significant school-to-school differences in the way teaching resources were allocated. This area of research has also begun to consider allocations across different types of pupils. Sutton (1991), for example, found that poor and minority children have less access to computers both at home and at school. Oakes (1985, 1990) examined the allocation of resources within high schools, and described the deleterious effects of tracking on the learning opportunities of different types of students.

There are also ongoing efforts to develop comprehensive indicators of school processes, sometimes called service delivery indicators or opportunity to learn (OTL) indicators (Darling-Hammond, 1992; Porter, 1991; and Stevens 1993). These innovative systems of indicators promise new ways of depicting resource inequalities within schooling systems. The main idea is to gain insights into things like content exposure, content

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11 Lankford and Wyckoff (1993) pp.13-26.

12 In this case, "core curriculum" is defined as four years of English, three years of social studies, three years of science, three years of mathematics, two years of foreign language and one-half year of computer science.

emphases, the enacted curriculum and quality of instructional delivery. Porter (1991, 1993) and his colleagues, for example, collected data on the enacted curriculum through direct observation, teacher logs and questionnaires to determine the impact of new state requirements on mathematics and science instruction.

Despite these advances, there is still much to learn about the internal allocation of school resources and how local education agencies (LEAs) have specifically responded to certain aspects of the reform and to increases in school funding. It is important that analyses like those conducted by Lankford and Wyckoff be extended to include disaggregated indicators of resource allocation phenomenon. Lacking in the literature, for example, are analyses which consider how areas of the school curriculum have been impacted by the reform movement.

IV. Data and Methods

Sample years selected for this inquiry are 1982-83, 1987-88, and 1991-92. These sample years were selected at approximately five year intervals to enable a longitudinal analysis of resource allocation trends. Another advantage of these sample years is that they intersect the two major stages of reform in New York State. The 1982-83 and 1987-88 sample years will reveal resource allocation trends prior to and following the publication of the Regent's Action Plan (1984). Similarly, the 1987-88 and 1991-92 sample years will reveal resource allocation trends prior to and following the publication of the New Compact for Learning (1991). When more recent data become available, follow-up analyses will be extended to include the 1994-95 school year.

I have restricted the analysis to "regular" K–12 school districts in New York by excluding operating institutional school districts, special residential school districts and those districts operating only an elementary or secondary program. A separate analysis is conducted for the Big Five city districts (Buffalo, Rochester, Syracuse, Yonkers and New York City). In addition to being fiscally dependent school districts, these five city districts are substantially larger than all other districts within the State (nearly one-third of the pupils within the State are from New York City alone). As a result, a separate analysis is typically conducted for the Big Five city districts in this type of inquiry.

These exclusions leave us with a sample size for 1982-83 school year of 626 school districts. The sample size for the 1987-88 school year is 649 districts. The samples size for the 1991-92 school year is 650 districts. Sample sizes across the school years vary for three reasons: 1) district consolidation during the period; 2) districts adding or deleting an elementary or secondary program; and 3) missing data.[13] The School Financial Master File (SFMAST), the Institutional Master File (IMF) and the Personnel Master File (PMF) of the Basic Education Data System (BEDS) were used for revenue, expenditure, enrollment, and staffing information. Figures reflecting the percentage of pupils qualifying for free and reduced price lunch (FRPL), property wealth per pupil and income per pupil came from the State Education Department's education finance research data base.

Readers interested in the origination of New York resources for education as well as the disposition of fiscal resources across school districts should obtain a copy of an earlier paper (Monk and Roellke, 1994a). The findings I report here focus on the allocation and use of professional staff across elementary, secondary and administrative levels of school operations. Particular attention is given to the disposition and utilization of teacher

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13 Multiple files of the BEDS system were utilized in this study. Missing data for a school district in any of the files necessitated removal of that district from the sample. Missing data was particularly a problem for the earliest study year (1982-83). For more on the problems associated with missing data and suggestions for improving the collection of district and school level fiscal and personnel data, see Roellke (1996).

resources across secondary school curricular areas.

Within the core subject areas of the secondary school curriculum, I differentiate between "advanced," "regular," and "remedial" type offerings. I relied on the course titles listed in the assignment code manual of the Basic Educational Data System (BEDS) to determine the type of course offering. I defined the core curriculum as courses in English, mathematics, science, foreign language, and social studies. I counted as advanced courses those subjects described in the manual as "advanced," "honors," "accelerated," or "college-credit." I counted as remedial those courses described as: "basic," "remedial," "practical," "developmental," or "corrective" (not special education). In those cases in which the type of offering could not be determined by the course title, I relied on teachers' descriptions of the type of pupils within the class. If the teacher reported a homogeneous class of "advanced placement" or "honors" pupils, I counted that offering as advanced. Heterogeneous classes with generic course titles were counted as regular offerings. Practitioners familiar with the source documents were consulted to verify decisions regarding the classification and coding of courses.[14]

In the within school disposition analysis, I report findings in several ways. First, I calculated full–time equivalent teacher staffing levels on a per 1,000 district pupil basis. For example, I calculated the number of full-time-equivalent elementary, secondary, and administrative professional staff per 1,000 pupils in the district. I also calculated the number of full-time-equivalent teachers in specific secondary school subject areas per 1,000 district pupils. These per 1,000 pupil indicators provide insight into the intensity of resources that are made available within the school. I then consider the degree to which these intensities are related to background structural features such as district spending levels, district size, district property wealth, and district income wealth. Within each category of analysis, where appropriate, I present data for the state average and for pupil quintiles. Quintile distributions reflect pupil counts, not district counts. That is, quintiles are constructed so that approximately one–fifth of the pupils in the state (excluding the Big Four and New York City) are contained within each quintile. I present the average results for each quintile where the average is weighted by the number of pupils in each district.

Inequalities in these resource intensities can arise from two sources: 1) there can be differences in the size of the overall pool of resources; or 2) there can be differences in how districts divide a given pool of resources across the various competing sub–units. For example, it is possible to find a difference in the teacher resources devoted to mathematics in two districts. The difference might be due to the fact that the two districts have different sized pools of resources to allocate; or, they might have the same pool to work with but decide to divide it in very different ways. Given this interest in internal resource allocation practices, it is important to examine directly the decision to divide the pool of resources in one fashion rather than another. In addition to the staffing level per 1,000 district pupils indicator, I provide the percentage share of the teaching resource pool that specific subject areas receive. This calculation of teacher time excludes consideration of "non-academic" teaching responsibilities such as study hall duty, cafeteria duty and other unassigned teacher time.

To address the interest in the utilization of resources, I construct three indices of resource utilization: 1) the percentage of pupil time allocated to secondary school subject areas; 2) a teacher time/pupil time utilization ratio calculated by dividing the percentage share of teaching resources devoted to a particular subject area by the percentage of student time allocated to that subject; and 3) the overall pupil load per full-time-equivalent secondary school teacher.

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[14] For a report on the case studies that were conducted to verify and supplement the empirical analyses using State collected data, see Monk, Roellke and Brent (1996).

I used class-specific enrollment information to generate a series of subject-specific indicators that tell us the percentage of the pool of student-time resource that is devoted to each area of the curriculum. The numerator in this calculation is total number of students enrolled in specific subject area courses. The denominator in this calculation is the total number of students enrolled in all subject area courses. This excludes "non-academic" allocations of pupil time for study halls, lunch or otherwise unassigned student time. With these two percentage share indicators in hand (percentage teacher time and percentage pupil time) it becomes possible to generate an index of resource utilization. In this report, I have relied upon a ratio of the two percentages as a measure of resource utilization. The teacher resource share appears in the numerator of the ratio, so a figure of 1.3 for a given subject area suggests that 30% more teacher resources than pupil resources are devoted to the subject in question. Thus, low readings on this indicator suggest that the teacher resource in question is facing relatively heavy demands.

Another important indicator of resource utilization within schooling systems is the overall pupil load. This indicator provides insight into the specific pupil demand faced by teachers within particular subject areas. This indicator has also received a great deal of attention in the reform literature. One of the guiding principles of Sizer's Coalition of Essential Schools, for example, is that teachers on the secondary level maintain an overall pupil load of less than 80 students (Sizer, 1993). This indicator differs from the per 1,000 staffing indicator in that it assesses the number of students actually enrolled in particular types of secondary school courses per full-time-equivalent teacher (rather than ratios based on district level enrollment counts). Class specific enrollment figures were also used to calculate overall pupil loads within each of the core subject areas. I constructed this indicator by calculating the number of pupils enrolled in specific subject area course and dividing these totals by the number of full-time-equivalent teachers allocated to those areas of the curriculum.

V. Empirical Results: The Allocation of Human Resources

General trends in the allocation of human resources. Table 1 displays the percentage of professional staff devoted to elementary, secondary, and administrative areas for the entire State (less the Big Five city districts) for three sample school years: 1982-83; 1987-88; and 1991-92. Because student enrollment can drive personnel needs and decisions, it is useful to consider these staffing patterns in light of demographic changes in the student population. Table 1 also displays the percentage of total student enrollment within elementary and secondary schools.

The third column for each sample year is the ratio of the percentage of professional staff over the percentage of student enrollment. A ratio of less than 1.00 indicates that percentage of staffing resources devoted to the level of education is less than the percentage of students enrolled in that level. Note that this ratio has been steady on the elementary level since 1983 and the ratio on the secondary level increased between 1983 and 1988 and remained steady between 1988 and 1992. These percentages and ratios reveal that secondary schools hire more professional staff relative to student enrollment than do elementary schools. The increased high school graduation requirements as outlined in the Regents Action Plan (1984) may help explain why personnel growth in secondary schools relative to student enrollment outpaced the growth in elementary schools between 1983 and 1988. The ratios also indicate that growth in professional staffing in secondary schools may have been at the expense of administrative areas.

Table 1
Trends in the Allocation of Professional Staff Relative to Student Enrollment
by Professional Staffing Category
State Aggregates

	1983			1988			1992		
Staff Category	% Staff	% Enr.	Ratio S/E	% Staff	% Enr.	Ratio S/E	% Staff	% Enr.	Ratio S/E
Elementary	36.6	48.7	.75	40.5	53.0	.76	42.6	55.8	.76
Secondary	47.4	51.3	.92	46.3	47.0	.99	43.9	44.2	.99
Administration	16.0	--	--	13.1	--	--	13.4	--	--

Table 2 indicates that despite declining enrollments during the period, overall professional staffing levels in the State have increased substantially between 1983 to 1992. This growth has not been linear as rapid growth took place between 1983 and 1988 and only modest growth in overall professional staffing took place between 1988 and 1992. One possible explanation that this growth has plateaued is the recent reductions in State aid, coupled with budget defeats at the local level.

Table 2
Percentage Changes in Professional Staffing and Enrollment
by Professional Staffing Category, 1983-1992
State Aggregates

	1983-88			1988-92			1983-92	
Staffing Category	% Staff Incr.	% Enr. Incr.		% Staff Incr.	% Enr. Incr.		% Staff Incr.	% Enr. Incr.
Elementary	+22.6	+3.4		+6.5	+7.1		+30.6	+10.8
Secondary	+8.5	-12.9		-4.1	-4.4		+4.1	-16.8
Administration	-8.6	--		+3.4	--		-5.5	--
Totals	+11.0	-5.0		+1.2	+1.7		+12.3	-3.4

Specific instructional and administrative trends over time. Table 3 displays staffing pattern findings by specific instructional and administrative areas. Between 1983 and 1992, an increase of over eight full time equivalent professional staff per 1,000 pupils is found in the State as a whole and in New York City and over a nine FTE increase is found in the Big Four City districts. The majority of this growth, particularly on the elementary level, occurred between 1983 and 1988. Staffing commitments to the "academic"[15] portion of the secondary school curriculum. Staffing commitments to special education increased substantially during the period (+27% on the elementary level and +55% on the secondary level), while staffing levels in vocational areas of the curriculum declined (-18%). In addition, special education has become the most resource intensive instructional category within the big cities.

It is also noteworthy that overall professional staffing levels in New York City have consistently trailed the levels in the other big cities and in the State as a whole. These

15 "Academic" is defined as any course in English, mathematics, science, foreign language, social studies, music and art, physical education and health, and other courses not classified as special education or vocational education.

differences are found at both the elementary and secondary level. The discrepancies are particularly prevalent in the academic portion of the secondary school curriculum Another interesting finding is that big city staffing commitments to administrative areas have consistently outpaced the staffing commitments made to administration in the State as a whole.[16] One can only surmise as to why these administrative levels are higher in the big cities. It is possible that the administrative burdens, such as student discipline, are greater at the school level in urban areas than in non-urban areas.

Table Three
District-Wide Instructional and Administrative Staffing Patterns
(Number of FTE Professional Staff per 1,000 District Pupils)
State Totals, Big 4 City Districts, and New York City
1982-83, 1987-88 and 1991-92 School Years

	State Totals			Big 4 Cities			NYC		
Staffing Category	1983 n=621	1988 n=644	1992 n=645	1983 n=4	1988 n=4	1992 n=4	1983 n=1	1988 n=1	1992 n=1
Elementary Regular	22.83	28.25	29.90	22.46	26.93	26.80	17.25	23.15	21.84
Elementary Special Educ.	2.89	3.28	3.67	5.11	6.45	5.66	4.97	5.01	4.73
Total Elementary Educ.	25.71	31.53	33.57	27.57	33.38	32.46	22.22	28.16	26.57
Secondary Academic Educ.	26.52	28.77	27.57	19.86	23.64	22.52	17.92	19.31	18.40
Secondary Vocational Educ.	4.61	4.43	3.79	5.53	5.32	5.55	3.12	2.73	4.42
Secondary Special Educ.	2.09	2.85	3.23	4.09	6.57	5.26	4.54	6.54	6.29
Total Secondary Educ.	33.22	36.05	34.59	29.49	35.54	33.34	25.58	28.55	29.11
Total District Admin.	11.19	10.23	10.58	13.29	14.77	14.02	11.71	11.79	12.37
Total Professional Staff	70.12	77.81	78.73	70.35	83.69	79.82	59.51	68.51	68.04

Refined subject area trends over time. State trends in the staffing of refined subject areas (advanced, regular, and remedial) within the core curriculum are displayed in first three columns of Table 4. These findings indicate that staffing commitments to both advanced and remedial offerings in the core were greater in 1992 than in 1983. This growth, however, has not been linear and slight declines in both advanced and remedial staffing levels are evident from 1988 to 1992. A similar pattern is found for overall staffing commitments to the core subject areas. There were increases (+1.74 FTE) in overall staffing commitments to the five core subject areas between 1983 and 1988 and slight decreases between 1988 and 1992 (-.78 FTE). These modest fluctuations in instructional commitments to these core subject areas suggest that the majority of increased staffing during the period was experienced outside the secondary core curriculum.

[16] In the big cities, administrative staffing intensities are greatest at the building (e.g., principals) and within building (e.g., department heads) levels. Staffing intensities at the central administration level are lower in the big cities than the State average. See Roellke (1996) for more details on these breakdowns.

Table 4
Refined Secondary Subject Area Staffing Patterns
(Number of FTE Professional Staff per 1,000 District Pupils)
Big 4 City Districts, New York City and State Totals
1982-83, 1987-88 and 1991-92 School Years

	State Totals			Big 4 Cities			NYC		
Staffing Category	1983 n=621	1988 n=644	1992 n=645	1983 n=4	1988 n=4	1992 n=4	1983 n=1	1988 n=1	1992 n=1
Advanced	1.21	1.62	1.55	0.78	1.23	1.18	0.93	1.02	0.70
Regular	17.29	18.13	17.60	12.54	13.73	13.05	10.78	11.60	11.46
Remedial	1.64	2.13	1.96	1.71	2.63	2.21	1.94	1.77	1.67
Total Core	20.14	21.88	21.10	15.03	17.59	16.44	13.65	14.38	13.83

Comparisons with the big five city districts. Table 4 also displays staffing trends within the refined areas of the core curriculum for the large urban areas. The overall staffing commitments to the core subject areas in the big cities, particularly New York City, have been consistently lower than in the State as a whole. The big cities also tend to devote slightly fewer staff positions to advanced areas of the curriculum than the State average. In each of the sample years, the Big Four had higher remedial staffing levels than New York and the State average. The most dramatic differences, however, are found in the regular core offerings, where the big cities have consistently hired less professional staff per 1,000 pupils than the State average.

Breakdowns by Selected District Structural Characteristics I was also interested in making comparisons among districts on the basis of structural characteristics such as district spending levels, school district fiscal capacity, and school district enrollment size. For each of the breakdowns by district type, I report findings for two of the three sample years. In each case, I have condensed the findings to depict general trends during the period. For more detailed tables which include specific subject area findings by district type and results for the 1987-88 school year, see Roellke (1996).

District Spending Level

Table 5 presents disposition findings by district spending level for the 1982-83 and 1991-92 sample school years. These findings indicate that as district spending increases, overall staffing increases. These increases are modest though through the first four quintiles and then a substantial jump is found between the fourth and fifth quintiles in each of the two sample years. The highest spending districts (Q5) also experienced the greatest growth in overall staffing since 1983 with an increase of 9.57 FTEs per 1,000 district pupils. Also note that the highest spending districts were able to maintain their administrative staffing levels, while the other quintiles experienced reductions. Moreover, it was the lowest spending districts which experienced the greatest decline in overall administrative staffing (-1.41 FTEs).

The findings in Table 5 also indicate that as spending increases, staffing commitments to advanced areas of the curriculum increase. This suggests that students in lower spending districts may have less access to advanced curricular offerings than their counterparts in higher spending districts. The pattern for remedial offerings is more mixed with the highest commitment occurring in the third spending quintile in 1992 (2.25 FTE per 1,000 pupils). It is interesting to note that the highest spending districts were the only ones

to reduce overall staffing commitments to the core over the decade. In addition, only the fourth and fifth spending quintiles reduced staffing commitments to regular areas of the secondary school curriculum over the period.

Table 5
Instructional and Administrative Staffing Patterns
(Number of FTE Professional Staff per 1,000 District Pupils)
By District Spending Level
1982-83 and 1991-92 School Years

1983	Q1	Q2	Q3	Q4	Q5
Staffing Category	1983 n=161	1983 n=141	1983 n=123	1983 n=85	1983 n=111
K-6	25.84	26.16	25.25	25.07	26.24
7-12	30.07	31.24	31.89	33.83	39.10
Admin.	9.56	10.33	10.49	11.70	13.86
Totals	65.47	67.72	67.63	70.60	79.20
Advanced (7-12)	0.65	0.90	1.11	1.37	2.02
Regular (7-12)	15.88	16.11	16.25	17.68	20.54
Remedial (7-12)	1.76	1.76	1.73	1.46	1.48

1992	Q1	Q2	Q3	Q4	Q5
Staffing Category	1992 n=87	1992 n=147	1992 n=167	1992 n=117	1992 n=127
K-6	32.78	32.62	33.52	33.35	35.21
7-12	31.42	32.46	33.40	34.36	39.82
Admin.	8.15	9.23	9.49	10.97	13.85
Totals	72.35	74.32	76.42	78.68	88.87
Advanced (7-12)	0.88	1.13	1.07	1.78	2.55
Regular (7-12)	16.85	17.14	17.20	16.91	19.62
Remedial (7-12)	2.02	1.89	2.25	1.90	1.77

District Fiscal Capacity

Table 6 displays the findings for overall staffing intensity level by district wealth for two sample school years, 1982-83 and 1991-92. The wealth breakdowns reveal patterns similar to the spending breakdowns. Staffing intensities tend to increase as property wealth increases, with the most dramatic increases occurring between the fourth and fifth quintiles. A slight decrease in overall staffing is found between the second and third property wealth quintiles in 1992. The wealthiest districts (Q5) experienced the greatest growth in overall staffing with an increase of 10.93 FTEs per 1,000 district pupils. Also note that the gap in staffing intensity between the poorest districts (Q1) and the wealthiest districts (Q5) has widened over the period. This widening of the gap is particularly prevalent in the administrative area where the poorest districts reduced FTE commitments by .96 FTE, while the richest districts were the only category of districts to increase staffing commitments to administration over the period.

Table 6
Instructional and Administrative Staffing Patterns
(Number of FTE Professional Staff per 1,000 District Pupils)
By District Property Wealth
1982-83 and 1991-92 School Years

1983	Q1	Q2	Q3	Q4	Q5
Staffing Category	1983 n=135	1983 n=128	1983 n=105	1983 n=110	1983 n=143
K-6	23.35	23.06	21.96	22.08	23.68
7-12	29.78	31.08	32.31	34.40	38.55
Admin.	9.82	10.01	10.93	11.37	13.81
Totals	66.00	66.93	68.25	70.45	78.99
Advanced (7-12)	0.78	0.98	1.06	1.40	1.85
Regular (7-12)	15.27	15.99	16.61	18.39	20.19
Remedial (7-12)	1.69	1.74	1.64	1.53	1.59

1992	Q1	Q2	Q3	Q4	Q5
Staffing Category	1992 n=194	1992 n=130	1992 n=103	1992 n=91	1992 n=127
K-6	30.75	29.41	28.76	29.14	31.67
7-12	32.73	32.75	33.09	34.58	40.23
Admin.	8.86	9.56	9.63	11.19	13.90
Totals	75.71	75.45	74.96	78.59	89.92
Advanced (7-12)	0.72	0.97	1.40	2.09	2.60
Regular (7-12)	17.25	16.73	16.72	17.29	20.22
Remedial (7-12)	2.36	2.12	1.86	1.77	1.70

Table 6 also illustrates that as district property wealth increases, staffing commitments to advanced areas of the curriculum increases and commitments to remedial offerings decrease. These staffing intensity patterns persist over time. As was the case in the spending breakdowns, these findings by property wealth indicate that students residing in the poorest districts may have less access to advanced courses than their counterparts residing in wealthy districts. The poorest districts (Q1 and Q2) were also the only group to reduce staffing commitments to advanced areas over the decade. Conversely, these poor districts (Q1 and Q2) led all other quintiles in increases in remedial staffing commitments between 1983 and 1992.

District Enrollment Size

Table 7 displays the staffing intensity findings for overall staffing level by district enrollment size for the 1982-83 and 1991-92 school year. The table shows that there are relatively high staffing per pupil levels in the smallest districts. A closer look at the individual staffing categories, however, reveals that benefits associated with economies of scale do not appear to filter into the administration area. In 1992, for example, districts with more than 5,000 pupils allocated more administrators per pupil than did districts between 500 and 1500 pupils. In addition, staffing levels drop dramatically from the first

to second quintile and then decrease much less dramatically through the remaining quintiles. Commitments to professional staff within the smallest districts increased by 12.9% and in the largest districts by 12.3 %. These findings suggest that district size did not appear to substantially affect the rate of staffing growth within school districts over the period.

Table 7
Instructional and Administrative Staffing Patterns
(Number of FTE Professional Staff per 1,000 District Pupils)
By District Enrollment Size
1982-83 and 1991-92 School Years

1983	0-500	501-1000	1001-1500	1501-5000	5001-10000	over 10000
Staffing Category	1983 n=54	1983 n=99	1983 n=135	1983 n=255	1983 n=63	1983 n=15
K-6	31.61	28.56	26.52	25.68	25.22	24.50
7-12	41.42	34.82	34.09	33.57	32.51	31.21
Admin.	13.10	10.42	10.54	11.37	11.68	9.97
Totals	86.12	73.81	71.15	70.62	69.41	65.68
Advanced (7-12)	0.28	0.41	0.78	1.19	1.39	1.69
Regular (7-12)	21.11	18.05	17.80	17.68	16.64	16.15
Remedial (7-12)	2.32	2.39	2.03	1.60	1.54	1.29

1992	0-500	501-1000	1001-1500	1501-5000	5001-10000	over 10000
Staffing Category	1992 n=65	1992 n=102	1992 n=144	1992 n=279	1992 n=58	1992 n=6
K-6	40.67	36.14	34.70	33.27	33.22	30.97
7-12	45.52	37.53	35.77	34.21	33.98	32.41
Admin.	11.08	9.06	9.50	10.80	10.93	10.40
Totals	97.27	82.73	79.98	78.28	78.13	73.77
Advanced (7-12)	0.45	0.66	1.11	1.61	1.75	2.10
Regular (7-12)	23.34	19.77	18.86	17.61	16.71	15.27
Remedial (7-12)	3.32	2.74	2.17	1.91	1.85	1.37

Staffing commitments to the core area of the secondary school curriculum steadily decline as district size increases. Staffing commitments to remedial areas of the curriculum tend to decrease as district size increases.[17] In 1991-92, for example, staffing intensity levels for remedial offerings within the smallest districts are nearly two and one-half times greater than in the largest districts in the State. Conversely, as district size increases, staffing commitments to advanced areas of the curriculum increase. The largest districts commit nearly five times as many staff members on a per pupil basis to advanced areas of the curriculum than do the smallest districts.

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17 The exception is a modest increase between the first and second size categories in 1983.

There is no reason to believe that students in smaller districts require more remediation (or are less capable of participating in advanced offerings) than their counterparts in larger districts. This suggests that staffing constraints within the smaller districts may preclude them from offering more advanced courses. These findings may also suggest that, within smaller districts, pupil demands for remediation are prioritized over pupil demands for advanced courses.

The above results provide insights into the intensity level of human resource allocation within the schooling systems of the State and how these intensity levels have changed since the 1982-83 school year. Table 8 displays the how the percentage share of teaching resources within secondary schools has been allocated over the same period. Special education and foreign language experience the greatest percentage increases in teaching resources over the period, while English and vocational areas of the curriculum experienced the sharpest decline.

Table 8
Percentage of Teacher Time by Secondary Subject Area
and Percentage of Teacher Time by Course Level
State Totals Minus the Big Five Cities

Staffing Category	1983 n=621	1988 n=644	1992 n=645	Net Change 1983-1992
Subject Area (7-12)				
English	17.13	16.31	15.84	-1.29
Mathematics	13.43	13.59	13.44	-.01
Science	12.01	12.26	12.22	+.21
Social Studies	12.73	11.65	12.11	-.62
Foreign Language	5.33	6.91	7.37	+2.04
Total Vocational	13.88	12.28	10.96	-2.92
Phys. Ed./Health	8.34	7.82	7.40	-.94
Music/Art	8.10	8.38	8.47	+.37
Special Education	6.29	7.90	9.34	+3.05
Other Secondary	2.77	2.88	2.83	+.06
Total Secondary	100	100	100	0
Course Level* (7-12)				
Total Advanced	3.64	4.49	4.48	+.84
Total Regular	52.05	50.29	50.88	-1.17
Total Remedial	4.94	5.91	5.66	+.72
Total Core	60.62	60.69	61.02	+.40

* Core subject areas only (English, mathematics, science, social studies, and foreign language)

Table 8 also displays the percentage of teacher time indicator by course level in the core academic subjects. The percentage of teaching resources in regular course offerings within the core has decreased over the period, while percentage increases are found in advanced and remedial courses. The percentage of teaching resources devoted to all core subject areas experienced modest fluctuations over the period. This suggests that while

overall staffing levels have increased over the period, and that there is some internal variation both within and outside the core subject areas (e.g., English vs. foreign language; special education vs. vocational education), school districts consistently devote roughly the same percentage share of the pool to the core curriculum.

VI. Empirical Results: The Use of Human Resources

The above disposition findings need to be viewed in light of information about the allocation of student time. A finding that there are 4.65 secondary math teachers per 1,000 district pupils enrolled, or that the percentage share of teaching resources devoted to special education is 9.34 percent is difficult to interpret in the absence of parallel information about the specific allocation of student time to these areas of the curriculum.

Table 9 displays percentage pupil time findings for the entire State (minus the Big Five City Districts). There are no net changes which exceed 3%. The greatest percentage increases are found in foreign language and special education and the sharpest percentage decrease is found in English and vocational areas of the secondary school curriculum. These vocational results represent student percentages based on courses offered only at the school level. New York State also provides for regional vocational offerings within Boards of Cooperative Education Services (BOCES). The modest declines in the percentage of pupil time devoted to mathematics and science (-.23 and -.22, respectively) are noteworthy given the heavy emphasis placed on these two subject areas in the reform literature.

Table 9
Percentage of Pupil Time by Secondary Subject Area
and Percentage of Pupil Time by Course Level
State Totals Minus the Big Five Cities

Staffing Category	1983 n=621	1988 n=644	1992 n=645	Net Change 1983-1992
Subject Area (7-12)				
English	18.77	17.22	16.57	-2.20
Mathematics	14.45	14.16	14.22	-.23
Science	12.53	12.51	12.38	-.15
Social Studies	15.19	14.08	14.97	-.22
Foreign Language	5.29	7.48	8.22	+2.93
Total Vocational	13.26	12.44	11.27	-1.99
Phys. Ed./Health	8.67	8.43	7.84	-.83
Music/Art	8.07	8.89	8.99	+.92
Special Education	1.60	2.53	3.29	+1.69
Other Secondary	2.18	2.17	2.24	+.06
Total Secondary	100	100	100	0
Course Level* (7-12)				
Total Advanced	3.83	4.56	4.59	+.76
Total Regular	58.99	56.91	58.19	-.80
Total Remedial	3.42	3.97	3.58	+.16
Total Core	66.24	65.45	66.37	+.13

* Core subject areas only (English, mathematics, science, social studies, and foreign language)

Table 9 also displays the how the percentage of pupil time has been allocated by course level (advanced, regular, remedial) over time. Between the 1982-83 and 1987-88 school years, the percentage of student time allocated to both advanced and remedial courses increased and student time allocated to regular areas of the curriculum decreased. Between the 1987-88 and 1991-92 school years, pupil time shifted away from remedial offerings and back toward regular offerings. The percentage of pupil time allocated to advanced areas since 1987-88 has remained steady. Over the entire period, student time allocations to the core subject areas has changed very little. This finding is interesting given the State's heavy emphasis placed on core subject areas in the Board of Regents Action Plan (1984). This also indicates that although there may be some internal variation in student course taking behavior both within and outside the core (e.g., English vs. foreign language; special education vs. vocational education), the percentage of student time devoted to core subject areas remains steady.

Teacher Time/Pupil Time Utilization Ratios. The utilization ratios in Table 10 were calculated by dividing the percentage share of teaching resources devoted to a particular subject area by the percentage share of student time allocated to that subject. Recall that a ratio less than 1.0 indicates that the share of the teacher resource that is allocated to the subject area is smaller than the share of the pupil resource base that has been allocated. Greatest variations in the utilization ratios in academic areas over the period are found in foreign language and music/art. The overall utilization ratio for the academic portion of the curriculum, however, has remained remarkably consistent. This suggests that despite some internal variation within these academic areas, the overall shares of teaching and pupil resources devoted to the core curriculum remain steady.

Although the highest ratios are clearly found in the special education area of the curriculum, it should be noted that ratios have declined consistently over the period. Because there have been consistent increases in the allocation of pupil time in special education over the period, this finding indicates that increases in pupil demand for special education are not matched with an equal increase in teacher supply. Conversely, student enrollments in vocational offerings have declined over the period. The declining ratios in vocational areas indicates that decreases in the allocation of teacher resources are outpacing the decreases in pupil time in vocational areas.

Table 10 also displays utilization ratios by course level (advanced, regular, and remedial) within the core subject areas. Recall that, during the period, there is some evidence that students were moving out of regular offerings and into advanced and remedial offerings. The steady utilization ratio for regular offerings within the core reported in Table 8 suggests that an equal percentage share of the teacher time and student time resource shifted out of regular offerings. Also note that the utilization ratios for advanced and regular offerings remained steady between the 1987-88 and 1991-92 school year, while the ratio in remedial offerings increased by .14. This suggests two things: 1) that the supply of teachers allocated to remedial education outpaced the increase in student demand for these courses; and 2) this increased supply of teachers to remedial courses occurred at the expense of a subject area outside the core.

Table 10
Percentage Teacher Time/Percentage Pupil Time in Secondary Schools
(Utilization Ratios)
State Totals Minus the Big Five Cities
1982-83, 1987-88 and 1991-92 School Years

Staffing Category	1983 n=621	1988 n=644	1992 n=645
Academic			
English	.91	.95	.96
Mathematics	.93	.96	.95
Social Studies	.84	.83	.81
Science	.96	.98	.99
Foreign Language	1.01	.92	.90
Music and Art	1.00	.94	.94
Phys Ed. and Health	.96	.93	.94
Other Academic	1.27	1.32	1.26
Total Academic	.94	.94	.93
Vocational			
Trade	1.15	.95	.92
Business	.93	.97	1.04
Other Vocational	1.10	1.21	1.17
Total Vocational	1.05	.98	.97
Special Education			
Resource Rooms	4.57	4.10	3.81
Special Classes	3.67	2.62	2.49
ESL	2.10	3.00	1.92
Other Special Education	--	6.00	2.46
Total Special Education	3.93	3.12	2.84
Course Level*			
Advanced	.95	.98	.98
Regular	.88	.88	.87
Remedial	1.44	1.49	1.58
Total Core	.92	.93	.92

*Core subject areas only

Overall Pupil Load. Table 11 presents the overall pupil demand results for the State as a whole (minus the Big Five cities). With the exception of foreign language, overall pupil loads within the core subject areas have reduced since 1983. English areas of the curriculum had the greatest reduction with a net drop of over 11 pupils per FTE. The most modest declines are found in the social studies area of the secondary school curriculum. A combination of reduced student enrollment over the period and increased professional staffing contribute to these declines in the overall pupil load. Table 9 also displays the overall pupil loads by course level within the core subject areas. Overall pupil loads in advanced courses and remedial courses tend to be substantially lower than the overall load in regular courses. Remedial courses experienced the greatest decline in overall pupil load

with a net change of -12.24 pupils per FTE.

Table 11
Overall Pupil Load per Full-Time Equivalent Teacher
By Secondary School Subject Area and Course Level
State Totals Minus the Big Five Cities

Subject Area (7-12)	1983 n=621	1988 n=644	1992 n=645	Net Change 1983-1992
English	104.02	92.16	92.88	-11.14
Math	102.89	91.67	94.36	-8.53
Science	99.48	89.43	89.99	-9.49
Social Studies	112.93	105.20	109.13	-3.80
Foreign Language	95.76	96.16	99.90	+4.14
Course Level* (7-12)				
All Advanced	99.10	87.61	88.09	-11.01
All Regular	106.39	98.87	101.48	-4.91
All Remedial	67.20	61.86	54.96	-12.24
Total Core	96.11	87.74	85.47	-10.64

* Core subject areas only (English, mathematics, science, social studies, and foreign language)

Table 12 displays the overall pupil load per full-time-equivalent teacher within secondary school core subject areas for the big cities. Differences between the large urban areas and the State as a whole are found in these indicators of resource utilization. Overall pupil loads are substantially greater in the Big Four and New York City than the State average.

Table 12
Overall Pupil Load per Full-Time Equivalent Teacher
Refined Secondary School Subject Area
Big Four and New York City

	Big Four				NYC		
Staffing Category (7-12)	1983 n=4	1988 n=4	1992 n=4		1983 n=1	1988 n=1	1992 n=1
English	113.09	98.38	93.26		110.19	115.10	111.71
Math Total	103.91	92.03	96.34		108.73	118.46	117.78
Science Total	118.04	97.05	99.56		132.83	130.53	130.87
Social Studies Total	119.53	105.06	109.04		126.97	134.19	133.19
Foreign Language	101.29	96.60	96.75		134.45	136.49	139.40
Course Level* (7-12)							
Total Advanced	110.49	89.93	93.98		118.51	124.60	126.77
Total Regular	114.06	102.18	103.52		124.42	129.87	129.79
Total Remedial	81.76	81.98	75.05		96.01	99.44	97.91
Total Core	107.19	93.34	92.30		117.22	119.29	119.60

* Core subject areas only (English, mathematics, science, social studies, and foreign language)

Pupil demand reaches a high of 139.60 pupils per FTE for foreign language in New York City in the 1991-92 school year. While other regions of the State have experienced a reduction in overall pupil loads, professional staff in New York City have experienced stable and even increasing pupil loads. Pupil loads in remedial offerings within New York City in 1992, for example, exceed the remedial loads in the Big Four by over 22 pupils and exceed the State average by nearly 43 pupils. Between 1988 and 1992, teachers in both the big four and New York City experienced increases in their overall pupil load in advanced courses and declines in the overall pupil load in remedial courses.

VII. Discussion

While the results above are too numerous and diverse to discuss in complete detail, there are several findings that are particularly relevant to discussions over the proper distribution of educational resources across levels and units of the schooling system. It is also possible to generate alternative explanations for the resource allocation behaviors that are presented in the data and to raise additional questions that emerge from the findings.

The heavy emphasis placed on secondary education throughout the reform movement and the increased high school graduation requirements as outlined in the Regents Action Plan may help explain why personnel growth in secondary schools has outpaced the growth in elementary schools. Others have commented that school systems within the State respond sluggishly to enrollment changes (Lankford and Wyckoff, 1993). The growth in staffing intensity levels in secondary schools may be a function of this inelastic response.

To some extent, the growth in secondary school staffing appears to have been at the expense of administrative staffing areas. These findings are important because they suggest that school districts configure staffing resources through a combination of adding new staff members and reallocating existing resources. It also counters many of the "administrative blob" arguments that are prevalent in the literature.

The big city findings point to dramatic differences in the allocation and use of human resources in New York City and the rest of the State. These differences are found at both the elementary and secondary level. Because the study is limited to an analysis of certified, professional staff, it is possible that these low staffing levels per student in New York City are due to a large number of non-professional and para-professional staff members being used in place of certified classroom teachers.[18]

Another interesting finding is that big city staffing commitments to administrative areas, particularly in school administration and subject area administration, outpace the staffing commitments made to administration in the State as a whole. One can only surmise as to why these administrative levels are higher in the big cities. It is possible that the administrative burdens, such as student discipline, are greater at the school level in urban areas than in non-urban areas. The large size associated with urban schools may also contribute to the growth in subject area administration.[19]

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[18] It has also been suggested that reported enrollment counts in subject specific courses in New York City may not accurately depict student demand on a daily basis. While a student may be officially on the roll the average daily attendance of students may be much lower. While this explanation is certainly plausible, I see no reason to conclude that this problem would be isolated to New York City.

[19] This explanation is consistent with the breakdowns by district size where the largest districts are found to have the highest staffing commitments to subject area administration.

Subject specific analyses point to growth in staffing intensity for foreign language and special education and to declines in English and vocational education. Slight increases are found in the staffing intensity levels in mathematics and science, two areas of the secondary school curriculum which have received a considerable amount of attention in the reform literature. Despite these internal shifts of teaching resources within the core (e.g., English vs. foreign language) and outside the core (vocational education vs. special education), the overall staffing commitments to these areas of the curriculum remains steady.

The general staffing pattern analyses by district type also yielded interesting results. The gap in staffing intensity levels between the lowest spending and poorest districts and the highest spending and wealthiest districts has widened since 1983. As spending and district wealth increases, staffing commitments to advanced areas of the curriculum increase and commitments to remedial offerings decrease. This suggests that students in low spending, low wealth districts may have less access to advanced and rigorous curricular offerings than their counterparts in high spending, high wealth districts. It also suggests that providing remedial services is a priority in low wealth, low spending districts.

These findings clearly have implications for particular types of students. Students in advanced classes in high spending, high wealth districts, for example, are doubly advantaged. Not only is there a larger base level of resource available to them, but they receive a larger share of the base. For students requiring remedial services, residing in a high spending, high wealth district has two conflicting effects. On the one hand, the these districts have higher resource levels. On the other hand, remedial classes receive smaller shares of the resource base in the higher spending districts. In sum, these findings have important equity implications as the quantity and quality of curricular opportunities for students appear to be contingent upon the structural characteristics of the districts in which they reside.

Analyses by district size revealed that general staffing levels are highest in the smallest districts enrolling less than 500 students. Districts enrolling over 500 students and less than 1000 students do not have substantially higher staffing levels than districts enrolling less than 10000 students. This suggests that the diseconomies associated with small district size may be limited to only the very smallest districts in the State. As district size increases, staffing commitments to remedial areas of the curriculum decreases. Conversely, as district size increases, staffing commitments to advanced areas of the curriculum increase. The largest districts commit nearly five times as many staff members to advanced areas of the curriculum than do the smallest districts. This suggests that staffing constraints within the smallest districts may preclude them from offering more advanced courses. Small districts, like poor and low spending districts, appear to prioritize remedial services in the resource allocation process.

Student use of teaching resources has undergone some change during the period studied. Overall pupil loads have declined consistently over time, suggesting that student class sizes are smaller in 1992 than they were in 1983. Students spent a greater percentage of their instructional time in both advanced and remedial courses in 1992 than in 1983, while time spent in regular offerings within the core have declined. This increase in the differentiation of students by ability level is noteworthy given recent emphases on inclusion, mainstreaming, and heterogeneous grouping.

XIII. Implications for Policy and Future Research

It should be noted that the empirical findings presented here are limited to analysis of professional staff only. Local education agencies purchase many hired resources which are not considered here (custodial workers, teacher assistants, cafeteria workers, clerical staff, etc.) The omission of this important pool of human resources limits the ability to gain a comprehensive understanding of resource allocation phenomenon. Despite this limitation, this type of resource allocation study has much to offer educational theory and practice and can make several contributions to the field. First, this type of inquiry can advance the study of micro-level resource allocation to a greater degree of refinement and sophistication through a longitudinal approach to tracing resource flows. Second, contributions to new conceptions of educational equity can be made through the analysis of more refined indicators of instructional opportunities for students. Third, this type of study can inform current policy debates regarding education reform, particularly those aspects of reform which involve the reconfiguration of teaching and other human resources.

Having the above research results in hand provides useful base-line data for the formulation of policy debates over the proper distribution of educational resources. In particular, the identification of resource allocation trends over time makes it possible to assess the impact of State education policies on local district practice. These data also allows us to begin to consider how this policymaking might be improved and to identify additional questions that need to be answered.

For example, much of the recent reform agenda in the State has focused on secondary school curriculum and teacher workload. I found that the rate of growth in professional staffing relative to student enrollment is substantially greater in secondary schools than in elementary schools. In addition, substantial reductions in the overall pupil load on the secondary level were found throughout the State, with the exception of New York City. These findings suggest that local districts do shift resources according to State priorities. The period I studied, however, also included a specific reform agenda which placed increased emphasis on foreign language, mathematics, and science instruction on the secondary level. While substantial changes in the allocation and use of human resources in foreign language are evident, relatively modest changes occurred in the mathematics and science areas of the curriculum.[20] This suggests that local school districts are able (or willing) to respond to some aspects of the reform agenda and not others.

I examined resource allocation trends by selected district structural characteristics in an effort to understand these different responses. The analyses yielded some interesting results as substantial inequalities in access to curricular opportunities exist across different types of school districts within the State. Students residing in poor, low spending districts, for example, have less access to professional staff than their counterparts in wealthy, high spending districts. Moreover, students in poor, low spending districts have less access to the more rigorous instruction associated with advanced curricular offerings than students in wealthy, high spending districts. Perhaps even more disturbing is that these gaps have increased over time. These findings by district type have important equity implications as specific curricular opportunities for students appear to be contingent upon the fiscal capacity of the district in which they reside. In a period of educational reform in which all students are expected to meet high standards of achievement, it will be critical to assure that these resource inequalities be remedied.

New York City schools are particularly understaffed compared to their big city

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[20] Others, such as Coley (1994) and Alexander (1996) ahve found more substantial changes in the course-tkaing patterns in mathmatics and science. Their work focuses on student course taking behavior in grades 10 through 12. This study examines staffing and student allocations in courses in grades 7-12, which is one possible explanation of the more modest fluctuations found here.

counterparts and the State as a whole. The fact that over 36% of the State's pupils reside in New York City, suggests that remedying these resource inequities should be a priority. These inequities are particularly troublesome given the fact that students in these urban areas are arguably among the most in need of additional educational services.

The smallest districts in the State maintain the higher professional staffing level intensities than their larger counterparts. Staffing levels drop dramatically, however, from the first to second quintile of districts, and then decrease much less dramatically through the remaining quintiles. A better understanding of the process by which small school districts allocate their human resources is needed. It may be possible that the smallest districts (which enroll less than 500 pupils) need to hire additional staff to meet State expectations for comprehensive curricular offerings.[21]

Another goal of this study has been to unlock the potential of the sophisticated data collection efforts undertaken by many States. These are costly data collection efforts and they remain woefully underutilized as a tool for policy makers and educational practitioners. Several important stumbling blocks were encountered when using the State collected data. First, slight variations in the coding conventions from year to year required meticulous accounting and classifications in order to be consistent from year to year. Case studies were required to verify the findings and to provide reassurance that the coding and methodology were reasonable. Second, the data were not easily accessible to policy makers and practitioners. The data are stored on large data tapes and extracting them required knowledge and technical expertise in computer programming. Numerous consultations with statisticians and data archivists were required to create usable data sets. With the advances in modern desk-top and "point and click" technology, these data could and should be made more accessible to the educational community.

Recently, the New York State Education Department has made some of this data available on the world wide web. In addition, there are ongoing efforts in the State to improve local district and school access to a data retrieval and manipulation system.[22] As advances continue to be made in this area, administrators and others will then be able compare the resource configurations within their schooling systems with those of other systems with similar structural characteristics and student populations. This kind of improved information system has real potential to facilitate school restructuring and school improvement efforts.

Because there is a potentially endless list of educational process variables, and it is very costly to collect and maintain these data systems, it is important to establish some priorities. Monk and Roellke (1995) propose three criteria for assigning priorities to data collection efforts: 1) policy relevance; 2) instrumentality and 3) ease of measurement. Odden (1993) also argues for limiting the data collection effort to those indicators which are policy relevant, instrumental and relatively easy to obtain and measure. He identifies five priority categories of educational process variables: 1) school time spent on instruction; 2) high school course taking patterns; 3) high school graduation and college entrance requirements; 4) measures of the curriculum actually taught in classrooms; and 5) type of pedagogy and instruction used.

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[21] Interviews conducted with administrators in small school districts have provided some evidence to support this claim. For more on the constraints faced by small school districts in New York State with regard to the human resource allocation process, see Roellke (1996).

[22] The project is modeled after a data system developed at the University of Missouri. See Monk (1995) for additional details.

While this work in New York demonstrates progress in the area of micro-level resource allocation, there are a number of research challenges and questions that remain. Why, for example, have New York City schools maintained or increased the overall pupil load while the remainder of the districts in the State made substantial reductions in the overall pupil load? With the heavy emphasis placed on mathematics and science education in the reform agenda, why have the teacher and student allocations to these areas of the curriculum remained relatively steady? What impact will the reductions in resource commitments to English areas of the curriculum have on student achievement? What are the conditions at the local level which give rise to these findings and what are the local constraints which might impede school districts from responding to State initiated reform?

Advances in the kind of resource allocation study described here can allow us to formulate answers to these important questions. A logical extension of this work, for example, is to trace the flow of human resources to even deeper points within the educational system. I do not explicitly address, for example, the allocation of actual student effort in the classes in which they are enrolled. The utilization measures employed in this study rely on simple class counts to capture the supply of student time to instructional activities. A major assumption of the reform movement of the last decade is that course-taking behavior is directly related to learning gains. That is, additional "core" and "advanced" courses will produce better outcomes. While these measures of student opportunity to learn are vital, it will be important to collect better information regarding the degree to which students come into actual contact with the dispensed resources and the effort they devote to these activities. Another important extension of this work involves linking these micro-level resource allocation analyses to measures of student performance. While it is important to understand how resources are allocated and used for equity purposes, concerns about the efficient use of these resources can only be addressed through an analysis of how these resources are translated into student outcomes.

Much remains to be learned from empirical studies, particularly those aimed at better understanding the actual learning opportunities afforded to students. It is hoped that the kind of micro-level approach utilized here will help inform the next generation of resource allocation studies.

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